



Exploring Comets and Modeling for Mission Success

Activity Overview



Created for the Deep Impact Mission, A NASA Discovery Mission
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Educator - Enrichment

1. FIRST, TELL THEM A LITTLE AND FIND OUT WHAT THEY KNOW.

Past Beliefs – Consider this!

What did people think about comets throughout history and in different cultures?
Show a picture of a comet. Use the “Consider This” page.

Where are comets in the Solar System?

Find a picture of the Solar System and see where the Kuiper Belt and Oort Cloud are in relationship to all the other bodies.

Use the “A Comet’s Place in the Solar System” page

Elicit #1 - What are your ideas about comets?

Use the “Exploring Comets” page to discuss questions and ideas about the composition and behavior of comets. Record students’ answers on a list to re-check later.

2. ADD TO THEIR KNOWLEDGE OF COMETS.

Activity - Make a Comet and Eat it!

Build a representation of a comet with ice cream and candy “debris” using “Make a Comet and Eat it!” Page. Discuss with students what is taking place as the ice cream forms.

Extension: Stardust’s “Cookin’ up a Comet”, Deep Impact’s “Chemistry of Ice Cream”

Explore More - Discussion:

Educator input: Discuss results of student “data” testing. Gather visuals of comets from web sites. Begin with less detailed visuals of comets and then show those with more detail (a picture of a comet, a comet with an ion tail, Shoemaker Levy 9 breaking apart, Giotto and Borrelly views of a comet nucleus). Make a drawing as a group showing components of a comet the students now recognize. It should have a nucleus, coma, two or three tails. Use “Ten Important Comet Facts” and “C-O-M-E-T-S”.

Elicit #2 - What new ideas do you have about comets, their origin and their composition?

Return to the list of original comet theories and questions the students recorded? Confirm or modify their original ideas. Add new information. Which ideas are still questions within the science community?

Elicit #3 – What ideas do you have about why scientists explore comets? What effect could comets have for and against us in the future?

3. NOW IT'S THEIR TURN TO DESIGN A MISSION

Thinking about modeling for the success of a mission:

Elicit #4 – Pick one thing scientists don't know about comets and design a mission around finding the answer.

As a group or individually, pick one goal for a mission and discuss how it might be met. Have students describe how the mission would work and what kind of real or imagined technology they would use in their design.

Use the introduction to modeling *“Deep Impact Comet Models”*. Why do mission teams have to prepare models of cometary environment on Earth in order to assure the success of their mission in space?

Activity: Comet on a Stick!

Make and evaluate the comet on a stick as a model. How would they improve it? How would they make a whole new model? Use *Comet on a Stick!*

Extension: *“Paper Comet with a Deep Impact”* (option to *“Comet on a Stick”*) or *“Comet Models based on the Deep Impact Mission”*, Stardust – *“Aerogello”* For a longer activity, try *“Excavating Cratering”*.

Elicit #5 – What kind of modeling can you do to test your mission's design and your comet's possible environment?

Have students discuss what they would need to know about cometary environment in order to continue design on their mission. What kind of model can they make here on Earth to test both the mission and the cometary environment?

Elicit #6 – What kinds of comet missions is NASA funding? Use *Deep Impact – Interesting Facts*. What kinds of technologies are comet missions using? Why?

Check out <http://deepimpact.jpl.nasa.gov> <http://stardust.jpl.nasa.gov> <http://www.contour2002.org>

Suggested Stardust activities appear on the Stardust web site.

Use *“Questions from Past Workshops”* as discussion or testing tool for students.

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